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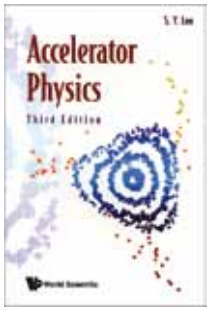

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Accelerator Physics
Third Edition
World Scientific, Singapore, 2011
pp. XX + 533, $101.99
ISBN 978-9-814-37494-1

The book begins with a short introduction mainly devoted to the historical development of the accelerators. The next three long chapters are the core of the book and treat in great details the transversal motion, the longitudinal motion (synchrotron oscillations) and the physics of electron storage rings. The last short chapter includes two special beam topics: the free electron laser (FEL), treated in 1D, and the beam-beam effect.

The Hamiltonian formalism is employed everywhere in the book for the linear motion, and canonical transformations to action-angle variables are used for the treatment of non-linear perturbations and resonances. Collective instabilities in the transverse motion (space charge, wake field) and longitudinal motion (microwave) are also covered.

The chapter on synchrotron motion includes topics as adiabatic capture, multiple RF system, the barrier RF bucket and beam manipulation as well as fundamental of RF system and linear accelerators.

Electron storage rings for high-energy physics as well as for the synchrotron light sources are considered and basic parameters of many accelerators are reported and compared. The properties of synchrotron radiation, the radiation damping and quantum excitation, the insertion devices and their influence on the beam dynamics are detailed. The dependence of the equilibrium emittance on the type of lattices (FODO, DBA,TBA, MBA) is discussed and figures are given for the theoretical minimum achievable.

There are useful short sections in each chapter on the basic technique of beam diagnostic and data analysis with examples taken from various accelerators. The original references to the most important developments in the field are given.

The book has been extensively used in the Accelerator Physics course at the Indiana University (where the author is a professor) and in the introductive courses of the USPAS (United States Particle Accelerator School)

There is almost all one needs on beam dynamics in the book although the topics are often kept at the essential level of explanation. The exercises at the end of each section are actually derivations of important results, which are normally included in the main text of introductory books, and sometimes they require really hard work.

There are some minor nuisances. The figures concerning the dipoles (normal and superconducting) are quite outdated and figures concerning quadrupoles and sextupoles are completely missing. There are more references to SSC (the Superconducting Supercollider project canceled in 1993) than to the running CERN-LHC, and too many examples are related to the closed (2002) Indiana Cooling Ring, a quite unique low-energy ring.

In conclusion this is a good book which goes well beyond the standard introductory text on the field. It is not well suited, in my view, for a basic introduction to the field being too much synthetic but is should satisfy the graduate student specializing in the field and the accelerator scientist willing to cover in major detail the fundamental aspects of the physics of particle accelerators.

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